BOXER

Practical Meshing Benefits of a Digital Geometry Approach

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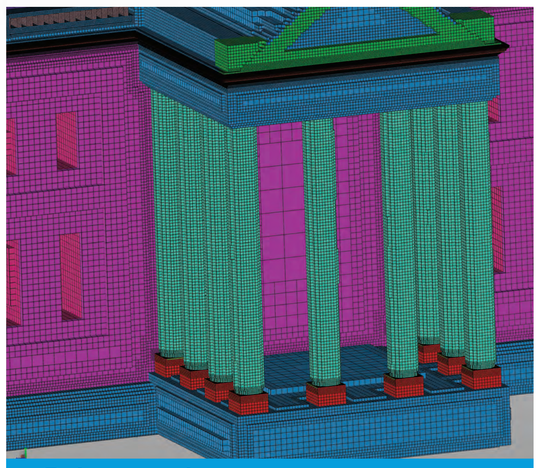
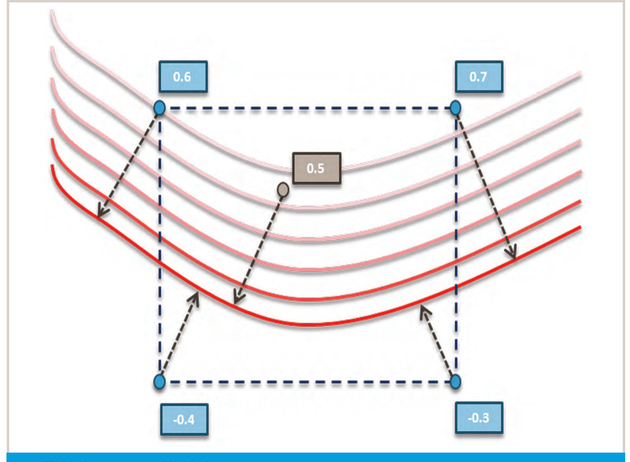


Octree mesh



Distance field

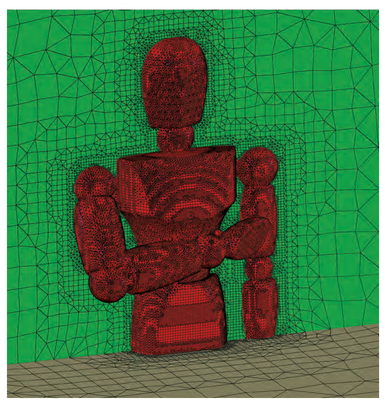
Cambridge Flow Solution's approach to geometry is based on an octree discretization of geometrical surfaces coupled to a distance field managed through level set technology – with the distance field carrying the information as to the location of the actual geometry. The combination of Octree mesh and distance field is referred to as digital geometry.

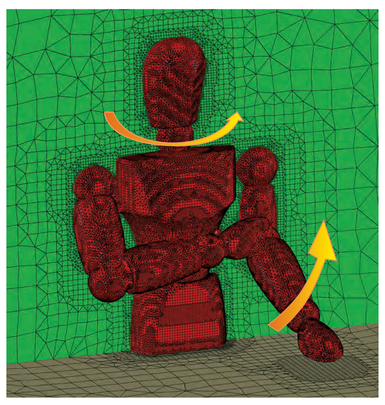
The digital geometry and mesh are partitioned and processed in parallel throughout the meshing operations.

A surface-based approach is used that reconstructs geometry. Sharp features are captured even in the absence of an explicit definition of CAD edges.

This surface-based, distance field approach delivers an inherent tolerance to CAD defects. The approach also allows users to merge and modify geometry within the meshing environment. This includes the ability to merge CAD of vastly different quality and origin, to modify/edit models and to perform Boolean operations on these models.

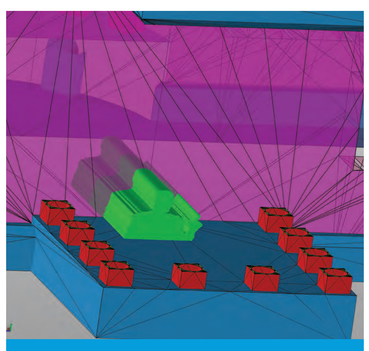
The poster illustrates these industrially-significant advantages on a practical application: the meshing of the White House. The ability to modify geometry within the meshing environment is shown: a manequin is inserted into the model, scaled and then modified to raise its left arm and rotate its head. These operations are carried out entirely using functions that are part of the Boxer toolset.



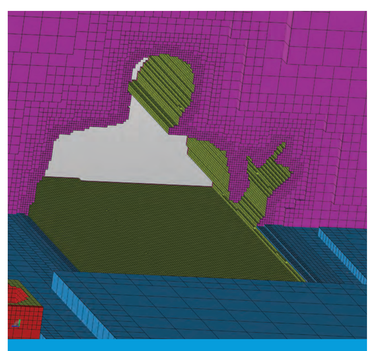


Rotation of the head and left forearm

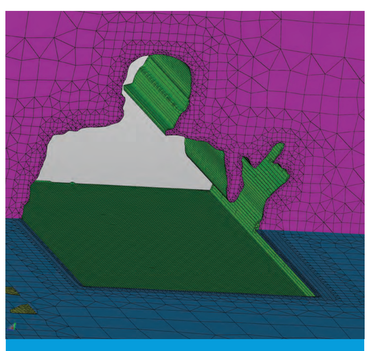
A Boolean subtraction operation is performed on the model. A tool formed by extrusion of the 2D profile of a person is imported into the model. The tool is then used within the mesher, preventing mesh from filling the corresponding volume and in effect opening a hole in the wall.



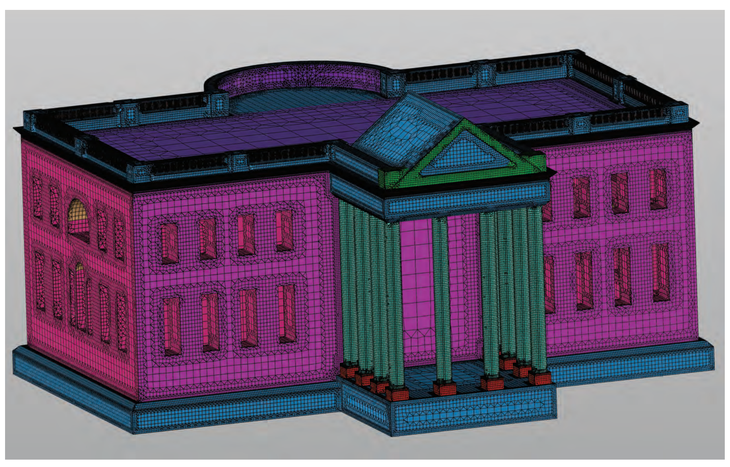
Geometry with imported tool

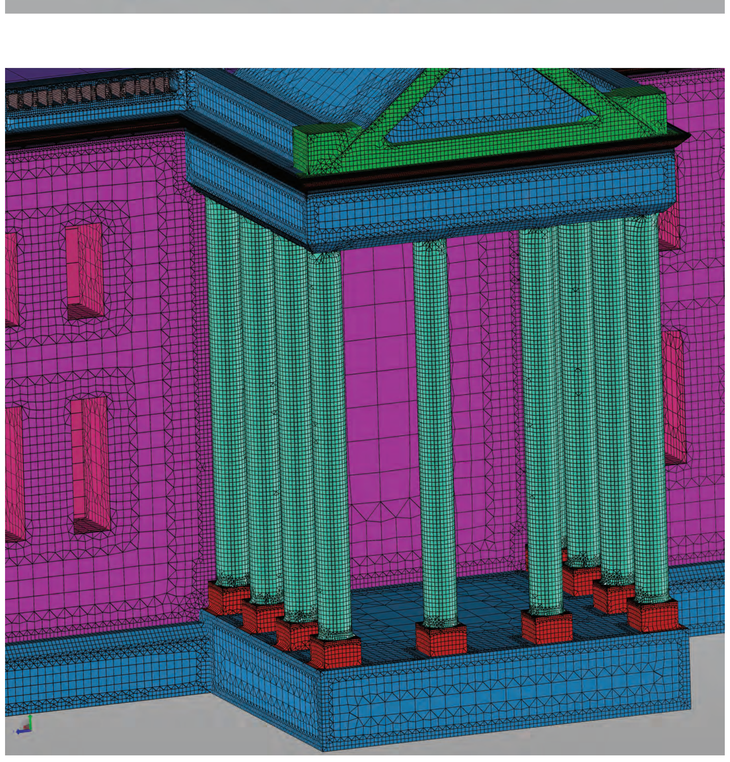


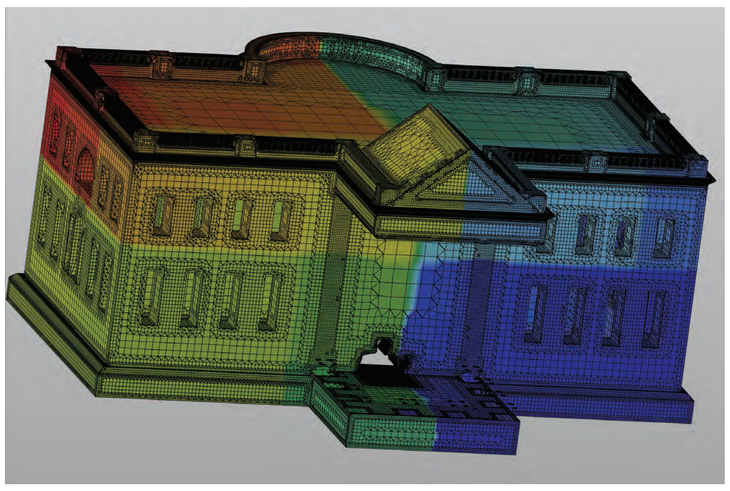
Octree mesh



Body-fitted mesh







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